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DEVELOPMENT AND TRANSFER OF TECHNOLOGY

Report by the Director-General

Summary

Reports on progress made in implementing the actions requested by the Board in paragraphs (c)(iii), (iv) and (v) of its decision IDB.8/Dec.10.

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Introduction

1. The Industrial Development Board in its decision IDB.8/Dec.10 requested the Director-General to submit a report to the Board at its ninth session on the progress made in the implementation of paragraphs (c)(iii), (iv) and (v) of that decision. The present progress report has been prepared in response to that request, and covers the period from the eighth session of the Board (July 1991) until February 1992. It should be read in conjunction with the relevant portions on the development and transfer of technology of the 1991 Annual Report (IDB.9/10, chap. III). It also relates directly to the implementation of the programme contained in document IDB.3/26 approved by the General Conference in its resolution GC.2/Res.4.

I. MINIMIZING THE COST TO DEVELOPING COUNTRIES OF DEVELOPMENT AND TRANSFER OF TECHNOLOGY

2. Activities to provide for the development and transfer of technology to developing countries under the best available terms and conditions is a major and continuing feature of the UNIDO programme in that area. In paragraph (c)(iii) of decision IDB.8/Dec.10, the Board requested the Director-General "to take steps to promote and encourage the development and transfer of technology on the basis of the least possible cost for developing countries on industrial sectors and subsectors included in the revised medium-term plan, 1992-1997 (PBC.7/17)". In response to that request, increased emphasis has been placed on elements of the technology programme designed to minimize the cost to developing countries in the development and transfer of technology. As reported in the Annual Report, 1991 (IDB.9/10), chap. III), activities in the programme closely followed the industrial sectors and subsectors included in the revised medium-term plan, 1992-1997 (PBC.7/17).

3. A new aspect of the programme will be the development of regular training courses using the UNIDO manual on technology transfer negotiations, which is being finalized as a primary teaching tool. The training courses are intended to upgrade the awareness and enhance the capabilities of negotiators in developing countries in order to secure the best possible contractual terms and

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conditions, and allow for sufficient absorption and assimilation and eventual upgrading of domestic technological capabilities. A set of UNIDO formats for training programmes in that subject was designed to meet the specific needs of targeted groups. The aim is to have these courses run by suitable institutions in developing countries on a regular and self-sustained basis.

4. Among the aspects of technology training courses organized by UNIDO in 1991 (IDB.9/10, chap. III, para. 27), were elements designed to minimize developing countries' costs in the development and transfer of technology. The Technological Information Exchange System (TIES), continues to be an active network of cooperation among developing countries not only in generating information, but also as a forum for discussion on current emerging issues of direct relevance to developing countries in their quest for obtaining technology at the lowest possible cost. In the African context, TIES activities implemented in connection with the Industrial Development Decade for Africa programme have focused on strengthening technology acquisition and development facilities as well as promoting assimilation and adaptation of imported technologies. For the biennium 1992-1993 the African-TIES programme aims to promote the sharing and utilization of technologies, know-how and expertise available in the region.

5. In the past, technology was transferred mostly through licensing agreements, and developing countries relied on regulatory functions to improve the conditions of technology acquisition. Today, however, the market has undergone a dramatic change with rapid technological advances and the emergence of new technologies. UNIDO programmes are already addressing this complex issue in relation to technology transfer trends, and new practices such as Build-Operate-Transfer (BOT) are being evaluated with a view to preparing guidelines for use by developing countries. A new feature of the UNIDO programme in the 1992-1993 biennium will be assistance offered in regard to practices and trends in the negotiation and export of technologies generated by the developing countries themselves.

6. In order to assist both Governments and enterprises in developing countries to negotiate the best terms for technology transfer, UNIDO operates the Technological Advisory Services Programme (TAS), designed to provide rapid and impartial assistance in solving specific problems that may arise in the transfer process.

7. With the aim of providing negotiators with a tool which would allow them to achieve faster and more effective negotiations, UNIDO is considering the possibility of developing an expert system comprising a draft contract generator and a complementary negotiation support system. A substantial amount of work has already been undertaken in identifying the features and architecture of the system as well as aspects amenable to automation, namely: (a) generation of a draft contract given the requirements and the position of the negotiator; and (b) assistance to negotiators in testing various options available at any stage during the negotiation.

8. UNIDO is continuing its work to strengthen the national technological capabilities of developing countries so that they may handle efficiently the whole process of technology information, management, selection, acquisition and commercialization in such a way that the end result is suitable technology at a reasonable price. Support is being extended to national technology programmes in some countries. Actions in that regard include the promotion of plant-level technical cooperation, the establishment of a technology market in Latin America, the organization of "technology marts" (the first having recently taken place in China) (ibid., chap. III, para. 24), and the promotion of appropriate energy-saving technology (steel and textile industries in Indonesia and Malaysia and an energy conservation centre in the Philippines). Further assistance is provided by making the international technological information system available to developing countries through the Industrial and Technological Information Bank (INTIB) networks in Africa, Asia and Latin America, and TIES (see para. 4 above), as well as providing direct technological information to entrepreneurs and industrialists.

II. TECHNOLOGY TO HELP IMPROVE TERMS OF TRADE IN AND INCREASE SHARE OF MANUFACTURED GOODS FROM DEVELOPING COUNTRIES

9. In paragraph (c)(iv) of decision IDB.8/Dec.10, the Board requested the Director-General "to encourage, in consultation with industrialized countries, the development and transfer of technology in areas which would help to promote better terms of trade in and an increased share of manufactured goods from developing countries".

10. Technology to promote healthy competition in manufacturing and to improve product quality, both through transfer and development, is a major issue for developing countries. As exporters of primary products, developing countries have been faced with a substantial decline in world market prices. The opportunity exists to increase substantially the added value of raw materials by the introduction of modern technology for domestic processing into semi-finished and finished products. Therefore the promotion of improved terms of trade and an increase in the share in world trade of manufactured goods from developing countries is a key objective of UNIDO's overall programme for the development and transfer of technology. Science and new technologies are having an ever-increasing impact on the pattern and direction of industrial development. Without knowledge of and access to new technologies, developing countries will find themselves excluded to an increasing degree from the mainstream of industrial production and international trade. The introduction of new technologies in traditional sectors such as iron and steel and textiles has brought about a complete change in the comparative advantage once enjoyed by the developing countries. UNIDO's programme on new technologies aims at assisting countries in the development and industrial application of these technologies, by strengthening national capacities as well as promoting international cooperation through the establishment of international and regional centres.

11. To bring their industrial production to a level qualitatively and quantitatively acceptable to potential trading partners, developing countries require access to up-to-date industrial and technological information and to modern

industrial technology. The issue of industrial and technological information is being addressed by UNIDO through various activities, among them INTIB, the Industrial Inquiry Service (IIS), technology publications and the computerized technology supply database. Access to modern technology is obtained through UNIDO programmes of technical cooperation, industrial investment promotion, enterprise-to-enterprise cooperation and in the case of new technologies through a number of promotional activities. To facilitate technological upgrading, UNIDO promotes the strengthening of links between research institutes, universities and industry, and assists in the establishment of incubators for technology-based enterprises. UNIDO is active in assisting in the development of institutions and mechanisms for quality control, metrology and standards. Support to technology management is also an increasingly important activity. This includes the issue of financing technological upgrading, for which regional workshops are to be held in the near future.

12. Monitoring new technological developments is the first step towards securing access to technology and determining the countries' technological options. In industrialized countries, technology is monitored by both Governments and industrial concerns to ensure R and D efforts are directed at critical areas of product development and cost reduction. Such activities are doubly important for developing countries with their limited resources and often greater susceptibility to the negative aspects of technology change. During 1991, UNIDO prepared a number of studies on global technology trends in the areas of biotechnology, new materials and computer software. Papers compiled as a volume were published on management of technological change in India. In addition, the Monitors on genetic engineering and biotechnology, micro-electronics, new materials and marine industrial technology, published quarterly, include information on relevant aspects of industry and trade. In the current biennium, studies are planned that will focus on technologies that have potential for manufacturing in the developing countries, such as changing technologies in the field of fine chemicals and precision mechanics.

13. The ability to compete and hence the adoption of advanced manufacturing technologies to cut costs and improve quality is an area of major concern to developing countries. A revolution based on integration is taking place in manufacturing. Companies today need to integrate order-processing departments with those handling purchasing. Design operations need to be integrated with those of manufacturing. And on a larger scale, the manufactured items from the developing world need to be integrated into what is increasingly becoming a global market - otherwise their role in the global economy will be negligible. At the same time, manufacturers of the developing world are faced with the loss of the possible comparative advantage, owing to lower labour costs, as these costs become less of a factor in overall product cost and competitivity. The Industrial Technology Development Division is addressing this area of concern by promoting the establishment of the International Centre for Advancement of Manufacturing Technologies (ICAMT). To promote awareness of the importance of manufacturing technologies and in preparation for the establishment of ICAMT, cooperation is being sought with Governments, companies and educational bodies in the developing and industrialized countries. A study was carried out at the National Institute for Training in Industrial Engineering, at Bombay, India, on the role of educational institutions in training engineers in advanced manufacturing technologies. In Brazil, another project, carried out in conjunction with the Federation of Industrial Enterprises of Sao Paulo, examined the role that industrial associations can play in addressing the needs of the manufacturing sectors. In 1991, a project financed by Japan, was implemented in Hungary and Poland on the identification of opportunities to strengthen manufacturing systems of selected industries through automization of the production process. Another programme activity on this subject included the provision of an expert to Mexico to advise on the establishment of a demonstration centre for electronics manufacture.

14. UNIDO activities in informatics are relevant to developing country exports in two ways. Firstly, it is to increase the efficiency and quality of products in all sectors of industry (including small and medium scale) which utilize computer technology, an aspect which was highlighted in the meeting of the Consultative Group on Informatics Technology held in December 1991. Secondly, several developing countries are in a position to export software. UNIDO activities in the field of telecommunications equipment encourage regional cooperation in order to both increase complementarity as well as trade within the regions. Those activities also recognize the importance of assistance in development of the testing telecommunications products as well as application of common industrial standards. In such activities, particularly in Asia, the need for identification of technological niches specific to particular countries has also been highlighted.

15. In regard to genetic engineering and biotechnology, production and trade with and across countries cannot be promoted without a transparent framework for the release of genetically modified organisms. In order to assist developing countries upon request in developing such guidelines, UNIDO convened two expert group meetings in 1991 and developed the Voluntary Code of Conduct for the Release of Organisms into the Environment (IDB.9/10, chap. III, para. 19). The Code is expected to promote the applications of biotechnology innovations in developing countries and facilitate transfrontier movement of commercially valuable products.

16. Several developing countries have an adequate research base but are not successful in commercializing their research results. In order to promote trade and commercialization of biotechnology innovations, representatives from industry, academia and government were brought together in October 1991 at an expert group meeting on commercialization of biotechnology. As a result of recommendations made at that meeting, work will be initiated on a promotion service for commercialization of biotechnology in developing countries with the help of a task force of experts to offer advice upon request to Governments interested in applying biotechnology commercially to relevant priority sectors. The promotion service will advise on mechanisms and marketing strategies already successfully adopted in developing countries in commercialization of biotechnology products.

17. In December 1991 UNIDO organized a regional expert group meeting in Africa (IDB.9/10, chap. III, para. 19) to consider specific areas in which modern biotechnology research and its results can be applied to important cash food crops in the region. Constraints to the transfer of technology were identified and innovative solutions were suggested which would also have a favourable impact for developing countries on trading those crops. A joint study regarding the impact of biotechnology on the export of agricultural products from developing countries highlighted such recent developments as increasing privatization research, increased industrial concentration and vertical integration and intellectual property protection, all of which have important repercussions for the trade and development prospects of developing countries.

18. A technology extension service is being launched for members of the Organization of East Caribbean States with the aim of assisting enterprises to assimilate and adapt technologies to make them more competitive, locally and on the export markets. The activity is a logical continuation to an ongoing effort to encourage technological modernization through assimilation and adaptation that was initiated in Africa with the Forum on Appropriate Technologies for Africa, Dakar, Senegal, 1989.

III. TECHNOLOGIES ADAPTED, PROMOTED AND DEVELOPED BY UNIDO

19. In compliance with paragraph (c)(v) of Board decision IDB.8/Dec.10, a list is given below of technologies adapted and promoted by UNIDO through technical cooperation projects, as well as of technologies produced by the Organization in favour of developing countries. The list should be considered in conjunction with the technologies listed in documents IDB.4/25/Add.1 (para. 40), IDB.7/17/Add.1 (para. 37) and IDB.8/24 (para. 60). In addition, technologies are promoted by UNIDO through its IIS, the technology supply database and technology marts (see paras. 8 and 11 above). More time and resources are required to classify and analyse the technologies listed, and to establish a system to enable developing countries to obtain detailed information on the status of those technologies.

Chemical industries sector

1. Preparation of user-friendly pesticides and pesticide formulations
2. Desilication of non-wood black liquor
3. Production of petrochemical products from agro-alcohol produced in the sugar industry
4. Production of nitrogen, phosphate and potassium fertilizers (in solid and liquid form, laboratory and bench scale)
5. Production of liquid natural rubber
6. Application and modification of liquid natural rubber
7. Production of composite materials based on natural rubber
8. Development of thermoplastic natural rubber
9. R and D for production of various enzymes for pharmaceutical and alimentary processes
10. Development of protocols for national chemical reference substances
11. Setting up of sensory evaluation panels for local essential oils and aroma chemicals

Metallurgical industries sector

1. Energy-saving and environment-friendly technologies; waste utilization
2. Development of photo-voltaic cells with amorphous silicon
3. Agglomeration of chromite ores
4. Environmental protection in zinc-lead smelting
5. Computerized managed maintenance in metallurgical plants (procuring, customizing and developing software programmes)
6. Industrial waste processing from direct reduction sponge iron plants, utilizing blue dust and other waste materials
7. Production of high strength low alloy (HSLA) steels
8. Production and continuous casting of commercial and special steels
9. New foundry technologies for spare parts manufacture and small foundries, including investment casting and other near-net shape casting methods
10. Heat and surface treatment, including metal corrosion and protection
11. High-tech welding and quality of welds
12. Processing of nepheline and alunite into alumina and other by-products
13. High temperature tube digestion of bauxite to alumina
14. Production of indium from copper containing raw materials
15. Extraction of gallium in alumina plants
16. Production of co- and by-products of alumina
17. Production of special grade alumina for ceramic insulators, automative spark plugs
18. Extraction of titanium from ilmenitic sands and ores
19. Production of titanium products by powder metallurgy methods
20. Beneficiation of gold containing ores
21. Extraction of gold by heap leaching and carbon-in-pipe operations
22. Beneficiation of iron ores (pilot plant operation)

23. Production of sponge iron

24. Recycling of lead from lead acid batteries

25. Advanced techniques for production of tungsten wire

26. Electroslag technology, alloy plasma arc treatment and electron beam technology

27. Technology for copper alloys used in electronics

Programme on clean technologies and industrial risk management

1. Compact used-oil recycling process

2. Linear tabular reactor for reclaiming used oils and decontaminating other hazardous wastes

3. Clean process for coal enhancement

4. Waste treatment for pickling lines and techniques for recycling sludges from pickling and settling ponds

5. Recycling, reuse and storage of fine dusts from electric arc furnaces and steelmaking slag

6. Total system for lime collection, storage, slaking and reuse

7. Waste water treatment from hot rolling mills (focusing on separation of oil)

8. In-plant environment monitoring methodology and instrumentation for air and water

9. Fine dust handling from sinter plants (focusing on improvement of existing direct and indirect suction systems)

10. Heat recovery from sponge iron plants and reheating furnaces

Other technologies

1. Biomass gasification

2. Energy conservation in the steel and textile industries

3. Commercial utilization of spirulina geitleri J. Di Toni (algae)

4. Detoxification of castor bean oil

5. Solar timber drying kilns

6. Poly-functional pilot-scale plant for plant extraction

7. Integrated cassava processing

8. Wooden bridges

9. Maize milling using hammer mills

10. Ferro-cement bins (cylindrical)

11. Multi-purpose agricultural machine production

12. Agriculture hand tools manufacture

13. Coconut cream production

14. Desiccated coconut

15. Canning of sardines

16. Oil extraction from copra using a small package expeller mill

17. Freezing of prawns

18. Guava processing

19. Dehydration of chillies

20. Small-scale bakers' yeast production

IV. ACTION REQUIRED OF THE BOARD

20. The Board may wish to take note of the present document.